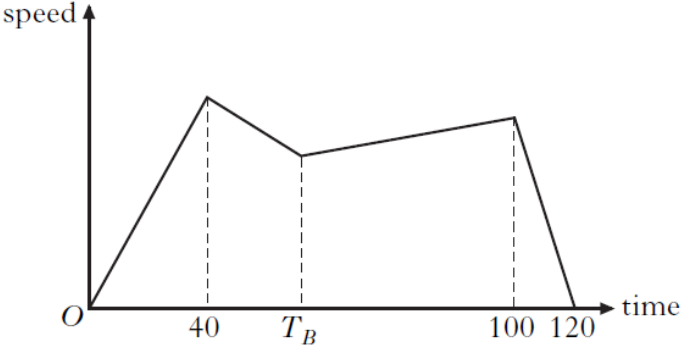


## Time Graphs

2011	<p><b>A2.</b> The speed-time graph of the motion of a car as it travels along a straight road is shown below. The car accelerates from <math>O</math> and passes markers on the road at <math>A</math>, <math>B</math>, <math>C</math> before stopping at <math>D</math> after 120 seconds. The car passes <math>A</math> after 40 seconds, <math>B</math> after <math>T_B</math> seconds, and <math>C</math> after 100 seconds.</p>  <p>The speed of the car between <math>A</math> and <math>B</math> is given by <math>v_1(t) = -\frac{1}{2}t + 45</math> (<math>40 \leq t \leq T_B</math>) and between <math>B</math> and <math>C</math> by <math>v_2(t) = \frac{1}{8}t + \frac{15}{2}</math> (<math>T_B \leq t \leq 100</math>), where the speed is measured in metres per second and time <math>t</math> is measured in seconds from the beginning of the motion.</p> <p>(a) Calculate the speed of the car at <math>B</math>. <span style="float: right;">3</span></p> <p>(b) Calculate the distance between <math>B</math> and <math>D</math>. <span style="float: right;">3</span></p>
2016 SP	<p><b>4.</b> A train travels from Glasgow to Stirling. It starts from rest and accelerates uniformly for the first 9 km of its journey. It then travels for 46.8 km at a uniform velocity, before decelerating uniformly to rest in 7.2 km. The total journey time is 33 minutes.</p> <p>(a) Sketch a velocity-time graph with appropriate units to represent this journey. <span style="float: right;">2</span></p> <p>(b) Calculate, in <math>\text{km h}^{-1}</math>, the maximum speed reached by the train. <span style="float: right;">4</span></p> <p>(c) State <b>one</b> assumption you have made in answering this question. <span style="float: right;">1</span></p>
2016	<p><b>6.</b> A remote controlled aircraft is flown from point A to point B. It accelerates for 10 seconds at a constant rate from rest to a take-off speed of <math>15 \text{ m s}^{-1}</math>. Once airborne, it accelerates for a further 20 seconds at a slower constant rate to a cruising speed of <math>u \text{ m s}^{-1}</math>. It maintains this speed for 60 seconds until it lands. The aircraft then decelerates for 10 seconds to a complete stop.</p> <p>(a) Sketch a speed-time graph of the journey, clearly showing all the important information. <span style="float: right;">2</span></p> <p>(b) (i) If the distance travelled from A to B is 1.725 km, calculate the value of <math>u</math>. <span style="float: right;">2</span></p> <p>(ii) State one assumption you have made about the path of the aircraft during your calculations. <span style="float: right;">1</span></p>